CLAIMS

1.   A control system of an internal combustion
engine having a valve mechanism able to change a valve
opening characteristic of at least one of an intake valve
and exhaust valve and burning an air-fuel mixture
comprised of fuel and air inside a combustion chamber to
generate power, characterized by being provided with
                a cylinder pressure detecting means for
detecting a cylinder pressure at said combustion chamber
and
                an intake air calculating means for
calculating an amount of air sucked into said combustion
chamber based on an intake air pressure during valve
overlap between said intake valve and said exhaust valve,
an exhaust gas pressure during valve overlap, a cylinder
pressure during the compression stroke detected by said
cylinder pressure detecting means, and a gas passage
effective area during said valve overlap.

2.   A control system of an internal combustion
engine as set forth in claim 1, wherein the exhaust gas
pressure during valve overlap is estimated based on the
cylinder pressure detected by the cylinder pressure
detecting means before or at the start of valve overlap.

3.   A control system of an internal combustion
engine as set forth in claim 2, wherein the exhaust gas
pressure during valve overlap is also estimated based on
a load of the internal combustion engine.

4.   A control system of an internal combustion
engine as set forth in claim 3, wherein when the load of
said internal combustion engine is higher than a
predetermined load, the exhaust gas pressure during valve
overlap is estimated higher than the cylinder pressure
detected by the cylinder pressure detecting means before
or at the start of valve overlap.

5.   A control system of an internal combustion
engine as set forth in any one of claims 1 to 4, wherein
said internal combustion engine has a plurality of said

combustion chambers and is provided with said cylinder
pressure detecting means for each combustion chamber and
the intake air pressure during the valve overlap in any
combustion chamber is estimated based on the cylinder
5   pressure at intake bottom dead center of another
combustion chamber where the intake stroke was executed
before that combustion chamber.

6.   A control system of an internal combustion
engine as set forth in any one of claims 1 to 5, wherein
10   the system is further provided with a second intake air
calculating means for calculating the amount of air
sucked into said combustion chamber by a different
technique from said intake air calculating means forming
the first intake air calculating means and calculates the
15   amount of air sucked into said combustion chamber used
for control of said internal combustion engine based on
the amount of air sucked into said combustion chamber
calculated by said first intake air calculating means and
the amount of air sucked into said combustion chamber
20   calculated by said second intake air calculating means.

7.   A control system of an internal combustion
engine as set forth in claim 6, wherein the amount of air
sucked into said combustion chamber in the current cycle
calculated by said second intake air calculating means is
25   corrected based on the amount of air sucked into said
combustion chamber in the previous cycle calculated by
said first intake air calculating means so as to
calculate the amount of air sucked into said combustion
chamber in the current cycle.

30   8.   A control system of an internal combustion
engine as set forth in claim 7, wherein the amount of air
sucked into said combustion chamber in the current cycle
calculated by said second intake air calculating means is
corrected based on the difference between the amount of
35   air sucked into said combustion chamber in the previous
cycle calculated by said first intake air calculating
means and the amount of air sucked into said combustion

chamber in the previous cycle calculated by said second intake air calculating means so as to calculate the amount of air sucked into said combustion chamber in the current cycle.

9. A control system of an internal combustion engine as set forth in claim 8 wherein, when the difference between the amount of air sucked into said combustion chamber in the previous cycle calculated by said first intake air calculating means and the amount of air sucked into said combustion chamber in the previous cycle calculated by said second intake air calculating means is a predetermined value or more, correcting the amount of air sucked into said combustion chamber in the current cycle calculated by said second intake air calculating means based on said difference so as to calculate the amount of air sucked into said combustion chamber in the current cycle, is prohibited.

10. A control system of an internal combustion engine as set forth in claim 1, wherein said gas passage effective area is calculated based on lift amounts of the intake valve and exhaust valve during said valve overlap and the engine speed during said valve overlap.

11. A control method of an internal combustion engine having a valve mechanism able to change a valve opening characteristic of at least one of an intake valve and exhaust valve and burning an air-fuel mixture comprised of fuel and air inside a combustion chamber to generate power, characterized by

calculating the amount of air sucked into the combustion chamber based on an intake air pressure during valve overlap between said intake valve and said exhaust valve, an exhaust gas pressure during valve overlap, a cylinder pressure at said combustion chamber during a compression stroke of said internal combustion engine, and a gas passage effective area during said valve overlap.